

To the Jericho Select Board:

January 26, 2012

The attached study examines the 81 streetlight fixtures currently leased by the Town of Jericho and calculates potential savings to the Town from removing unnecessary lights and upgrading the remaining fixtures to more efficient technology. A rating system was developed to evaluate each fixture location that takes into account road type, traffic level, pedestrian facilities, other road hazards, proximity to other lights and general light placement. Applying this rating system produced the following results:

- 15 fixtures identified for possible removal
- 66 fixtures identified as candidates for upgrade
- 4 locations for possible new lights

Following the recommendations outlined in this study will save Jericho taxpayers almost \$5700 annually:

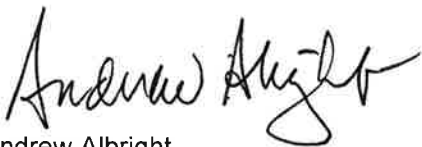
Removals	(\$2,868)
Additions	\$552
Upgrades	(\$3,355)
Total	(\$5,671)

Thanks to a special incentive offered by Efficiency Vermont, the Town should incur no cost to upgrade any fixtures to more efficient LED (light-emitting diode) technology.

The attached report describes the study methodology and conclusions. Appendix A is a list of all the existing lights and the factors used in evaluating their placement. Appendix B lists recommended locations for new lights. Appendix C explains the rating system. Appendix D consists of photos and maps of locations where we recommend removing, adding or relocating lights.

Finally we strongly recommend that the Town develop a set of uniform standards for placement and selection of new street lights, so that as future construction and development takes place new lights will be added in appropriate locations, using the most efficient technology and designed and oriented for maximum public benefit.

Respectfully submitted,



Andrew Albright  
Co-chair  
Jericho Energy Task Force

## JERICO STREET LIGHTING STUDY 2012

Following a workshop presented by Efficiency Vermont in October 2010, the Jericho Energy Task Force undertook a study of street lighting billed to the Town, with the intention of finding cost and energy savings for the Town. Savings can be obtained by removing fixtures or replacing fixtures with more efficient technology. Efficiency Vermont currently offers financial incentives to make efficiency upgrades easy and very attractive. These incentives, along with new utility tariffs, make it possible for the Town to have better street lighting and reduce its electric bill by about 30%.

## PURPOSE OF STREET LIGHTING

Publicly-financed street and area lighting should serve a *public purpose*, such as:

- Improved safety for motorists and pedestrians, especially in locations with high traffic, pedestrian crossings, intersections, sharp turns or other traffic safety hazards
- Creating a sense of security for pedestrians on sidewalks or in public areas such as parks
- Providing a visual cue to motorists to moderate their speed because they are in or entering a congested area or restricted speed zone

Because street lighting is provided at taxpayer expense, lighting which serves no clear public purpose should be removed, and lighting which is not efficient (in terms of either technology or location) should be upgraded. At the same time, lighting should be added where it doesn't currently exist if it would serve the public purpose as described above.

## CURRENT SITUATION

The Town of Jericho currently pays for the following street lighting fixtures:

- 36 Town-owned fixtures served by Central Vermont Public Service
- 75 non-metered fixtures leased from CVPS, mounted on CVPS poles
- 6 non-metered fixtures leased from Vermont Electric Cooperative, mounted on VEC poles

The Town-owned fixtures were installed in August 2010 and were not included in the Task Force study.

Both utility companies offer street light fixtures leased at flat daily (CVPS) or monthly (VEC) rates that include energy as well as full lifetime maintenance. Both companies also offer flat-rate (non-metered) service for municipally-owned fixtures attached to utility-owned poles, at slightly lower rates that include only limited maintenance. Leasing is generally preferable because full maintenance is included, although it limits fixture selection to those offered by the utility.

## STREET LIGHTING TECHNOLOGIES

The most common street lighting technology is the mercury-vapor (MV) lamp, analogous to the common fluorescent tube. Most of the fixtures leased from CVPS and all of the fixtures leased from VEC are MV lamps. Neither utility offers this technology for new installations.

High-pressure sodium (HPS) lamps use a sodium compound in place of mercury vapor for more efficiency. They are easily distinguished by the orange-yellow light emitted. Only a handful of HPS lamps are installed in Jericho.

Metal halide (MH) lamps use various metal salts in place of (or in addition to) mercury vapor. While slightly more efficient than MV lighting, MH lamps are being phased out by both utility companies.

Light-emitting diodes (LED) are a relatively new technology that is quickly becoming the preferred standard due to superior light quality, high efficiency, long life and low maintenance. LEDs are solid-state devices with a very even light output that degrades more slowly than other lighting technologies. Compared to MV, LED fixtures typically use almost 50% less energy for the same lighting level and are projected to last at least twice as long. The Town-owned lights installed in the Jericho Corners streetscape project in 2010 use LED technology.

Both utilities added LED options to their street lighting tariffs during 2011, at rates somewhat lower than they currently charge for MV lighting. These tariff changes, combined with conversion incentives from Efficiency Vermont, provide the Town with a very attractive opportunity to improve both the quality and efficiency of street lighting while saving taxpayers a considerable amount.

## EVALUATION METHODOLOGY

We obtained a list of leased fixtures from both utility companies. Using the lists, we verified each fixture's location (there were a couple of minor discrepancies, mostly having to do with the way each utility described the location). We determined latitude and longitude coordinates for each fixture in order to produce an accurate map. Using that map and data obtained from Chittenden County Regional Planning, we added the road classification and approximate traffic counts as available. Over a period of several months we visited each fixture location to inventory site conditions not apparent from the map.

During the summer we used a light meter (borrowed from Efficiency Vermont) to measure lighting levels at approximately half the fixture locations. Lighting levels were similar enough at the locations we measured that we didn't feel it was necessary to measure lighting levels for all lights. Based on the measurements obtained we determined that the lowest-wattage LED fixture would produce better light than almost any currently installed MV fixture.

A scoring system was developed that allocates points for each light based on road type, traffic level, road hazards (such as intersections) and public areas (such as sidewalks and crosswalks). A final category allowed points to be added or deducted for conditions that couldn't be adequately measured in the other categories - for example, some fixtures are attached to poles located quite far from the road, and while road conditions might warrant a light, it's not much use if it's too far from the road. Details of the scoring system are explained in Appendix A.

A fixture with a total score of less than 60 points has insufficient public purpose. We recommend removing those fixtures. Fixtures receiving 60 or more points should be upgraded to LED technology.

## REMOVALS

The greatest energy and cost savings result from complete removal of an existing fixture. While we recommend removal of some lights, most of the street lighting fixtures leased by the Town are located along densely developed sections of the major roads (VT15, Browns Trace and Lee River Roads), at critical intersections, or adjacent to pedestrian crossings or along sidewalks, and thus meet the definition of public purpose. Where the light doesn't appear to serve a public purpose, or is redundant or improperly located, we recommend removal.

Specific fixtures recommended for removal include

- Mill Street: extremely low traffic, no pedestrian facilities
- Wilder Rd: extremely low traffic, no pedestrian facilities
- Milo White Road: extremely low traffic, no pedestrian facilities
- Ayers Drive: extremely low traffic, no pedestrian facilities
- Old Pump Road (2 fixtures): low traffic, no pedestrian facilities. Note that we recommend installing new fixtures at other locations on this road. See New Fixtures, below.
- Sunny View Drive (4 fixtures): low traffic, no pedestrian facilities
- Lee River (at Plains Road intersection): adjacent to several other lights
- Rt 15 (south side, between Cilley Hill and Packard Rd): too far from the road and oriented in the wrong direction; there are no appropriate locations on the other side of the road and two other lights in the immediate vicinity
- Rt 15 (between Mt View and Lawrence Heights): the pole is too far from the road

While some individual residents may be happy to be rid of nuisance light, others may fear that removing lights will invite crime. This can be a legitimate concern in public areas such as parks or sidewalks, but the purpose of public street lighting is the safety of public pedestrian and vehicular traffic, not the protection of private property. Residents concerned about preventing or deterring crime at their property are free to install area lighting at their own expense.

Where removals are recommended, we suggest:

- Immediate neighbors should be forewarned of any recommended removals and given a period of time to comment. Public comments should be weighed by the Select Board in determining whether to proceed with the removal.
- The light should be temporarily disconnected for a test period of at least 30 days.
- After the test and the comment period, if the Select Board determines that removal is warranted, adjoining residents can be given the opportunity to "adopt" the light. The utility companies will lease lights to anyone at the same rates paid by the Town.
- If the Select Board decides not to remove a light, we strongly recommend that the light be upgraded to LED technology.

Photos and maps of the recommended removal locations, along with detailed descriptions, are included in Appendix B at the end of this report.

## UPGRADES

All remaining lights should be replaced with 39-watt LED fixtures to replicate existing lighting conditions as nearly as possible. Replacement on any other basis (for example, wattage or lumens) would appear to increase the light intensity due to the photometric qualities of LED lighting. This is not a desirable outcome since increased lighting intensity may actually reduce safety for motorists and pedestrians, as well as creating a nuisance for adjacent homeowners.

In some locations we recommend more careful attention to fixture location and orientation in order to improve lighting conditions and reduce potential light pollution. Higher light intensity does not compensate for poor fixture location or orientation. Specific recommendations for each fixture are listed in Appendix A.

## NEW FIXTURES

In the course of the study we noticed a few locations where conditions suggested adding lights:

- Old Pump Road: at one or both ends of the one-lane bridge (1 or 2 fixtures)
- Cilley Hill Road: at the south end of the one-lane bridge (1 fixture)
- Lee River Road: at the intersection of Clover Lane and Twin Meadows Drive (1 fixture)

Photos and maps of these locations, along with detailed descriptions, are included in Appendix B

All of these new fixtures should be 39-watt LEDs supported on *minimum* 4-foot arms. Ideally the new lights on Old Pump Road and Cilley Hill Road should be controlled by photocells *and* motion sensors so that they are activated by traffic approaching from either end of the bridge (use of motion controls is made practical by the fact that LEDs, unlike gas-vapor lighting, start immediately with no “warm-up” period). This control scheme minimizes operating time and provides an important visual cue to motorists and pedestrians. The

While we did not set out to recommend adding any lights, the idea sprang from the apparently random location of existing lights on Old Pump Road (e.g., in low-hazard areas not near the high-hazard one-lane bridge). Our mission as an Energy Task Force is to find energy (and cost) savings for the Town, not to determine the best locations for new street lights; therefore we did not look far beyond the locations of existing lights. Determining possible locations for additional lights is way beyond the scope of this study.

We strongly recommend that the Town develop a set of uniform standards for placement and selection of new lights, so that as future construction and development takes place new lights will be added in appropriate locations, using the most efficient technology and designed and oriented for maximum public benefit.

## RELOCATIONS

We recommend relocating one fixture on Route 15 from the north side of the road to the south side. The fixture is currently located on a CVPS pole identified as Circuit 3, Pole 120, approximately 50 feet west of the Griswold Street intersection (see the map in Appendix B). We recommend relocating it to the pole at the intersection of Griswold Street and Route 15. This location would improve safety at the intersection, yet it doesn't significantly affect the spacing of lights in the restricted speed zone along Route 15. Note that as of January 24, this light fixture is not functioning.

### COST OF UPGRADES

Both utilities require payment of the retirement cost (undepreciated capital cost, plus labor) for any lighting upgrades. This cost would ordinarily be a significant barrier to efficiency improvements; however, Efficiency Vermont has agreements with both utility companies to subsidize 100% of the retirement cost for lights upgraded to LED technology. Because of this incentive agreement, there is essentially no cost to the Town for switching to LEDs.

Most streetlights are mounted on 4-foot arms. In some locations the pole is located much more than 4 feet from the road. In these locations we've recommended mounting LED fixtures on longer arms to get more light on the road surface. Because LEDs weigh considerably less than the older technologies, we don't think the utilities will object to using longer arms; however, an additional charge may apply. We believe the charge, if any, will be minimal and provide much better lighting.

### BENEFITS

Implementing the recommendations in this report will produce significant financial benefits:

- The biggest financial benefit results from removing a light. If all of the recommended removals are implemented, the Town will save approximately \$2868 annually.
- The recommended upgrades will save the Town approximately \$3355 annually.
- Recommended new lights will cost the Town approximately \$550 annually.

Net financial savings to the Town will be approximately \$5700 annually. See Appendix A for a detailed calculation of savings.

Efficiency Vermont has offered to estimate the emissions savings (in tons of CO2 annually). As of January 25 that calculation is not yet available. In addition, we've asked for an estimate of the mercury eliminated by reduced emissions and retirement of mercury-vapor lighting fixtures. While this benefit is not exclusive to Jericho, residents can take some satisfaction in knowing they've contributed to a cleaner planet.

Upgrading all of the remaining leased streetlights to the same style LED fixture will result in uniform lighting levels at all illuminated locations. LEDs produce a subtle, soft blue-white light often described as similar to moonlight. While not appealing to everyone, the photometric qualities are generally superior to all gas-vapor lighting, with more accurate color rendition, less glare and better focus.

Finally, we suggest that the Select Board adopt a standard system for evaluating public lighting requirements for future development. This system will help to insure that street lighting is provided at locations where it is needed for public safety. The standards should address public safety, traffic calming, lighting quality, energy efficiency and light pollution. At a minimum, the Town should require that all public and private outdoor lighting utilize the most energy-efficiency technology available.

## Appendix A

## Existing Jericho streetlights

1/26/2012

FIXTURE INFORMATION				LOCATION INFORMATION				ROAD DATA				SCORING				RECOMMENDATIONS															
Index	type	watts	utility	Line	Pole	year	Rd	Name	TH	latitude	longitude	Vtrans	class	AADT	paved	normal	posted	speed limit	road type	traffic count	road hazards	Public area	Location	SCORE	TOTAL	action	current cost	new cost	savings	annual kWh	comments
1	MV	100	CVPS	3	28	1965	Rt 15		15	44.524779	-72.945414	1	7600	Y	50	35	35	0	30	40	130	50	0	250	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)		
2	MV	100	CVPS	3	30	1974	Rt 15		15	44.524018	-72.945526	1	7600	Y	50	35	35	0	30	40	40	30	20	0	120	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
3	MV	100	CVPS	3	32	1972	Rt 15		15	44.523216	-72.945953	1	7600	Y	50	35	35	0	30	40	40	30	20	0	120	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
4	MV	100	CVPS	3	34	1965	Rt 15		15	44.522861	-72.946299	1	7600	Y	50	35	35	0	30	40	40	30	20	0	120	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
5	MV	100	CVPS	3	36	1972	Rt 15		15	44.521940	-72.945811	1	7600	Y	50	35	35	0	30	40	40	30	20	0	120	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
6	MV	100	CVPS	3	38	1972	Rt 15		15	44.521285	-72.947268	1	7600	Y	50	35	35	0	30	40	40	30	20	0	120	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
7	MV	100	CVPS	3	40	1972	Rt 15		15	44.520516	-72.947651	1	7600	Y	50	35	35	0	30	40	40	130	0	0	200	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
8	MV	100	CVPS	3	42	1972	Rt 15		15	44.519765	-72.947799	1	7600	Y	50	35	35	0	30	40	40	30	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
9	MV	100	CVPS	3	44	1972	Rt 15		15	44.518929	-72.947875	1	7600	Y	50	35	35	0	30	40	40	30	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
10	MV	100	CVPS	3	46	2004	Rt 15		15	44.518245	-72.947919	1	7600	Y	50	35	35	0	30	40	40	30	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
11	MV	100	CVPS	3	47-1	1972	River Road		5	44.518346	-72.947476	2	3800	Y	35	25	25	0	30	30	30	30	20	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
12	MV	100	CVPS	3	47-3	1972	River Road		5	44.518906	-72.946570	2	3800	Y	35	25	25	0	30	30	30	30	20	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
13	MV	100	CVPS	3	49	1965	Rt 15		15	44.517138	-72.946656	1	10600	Y	50	40	40	0	30	50	50	50	20	0	150	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
14	MH	50	CVPS	3	51	2010	Rt 15		15	44.516480	-72.948310	1	10600	Y	50	40	40	0	30	50	50	20	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(48)	
15	MV	100	CVPS	3	52	1965	Rt 15		15	44.516138	-72.949637	1	10600	Y	50	40	40	0	30	50	50	20	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	longer arm
16	HPS	70	CVPS	3	65	1993	Rt 15		15	44.511969	-72.954412	1	10600	Y	50	50	50	0	30	50	50	80	0	0	160	upgrade to LED	\$185.42	\$137.97	\$47.45	(136)	longer arm
17	HPS	150	CVPS	3	78	1993	Rt 15		15	44.510486	-72.961930	1	8800	Y	50	40	40	0	30	40	40	20	50	0	140	upgrade to LED	\$237.98	\$137.97	\$100.01	(486)	
18	MV	100	CVPS	3	93	1983	Rt 15		15	44.509134	-72.971534	1	8800	Y	50	40	40	0	30	40	40	110	0	0	180	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
19	HPS	70	CVPS	3	95	1994	Rt 15		15	44.509985	-72.972893	1	8800	Y	50	40	40	0	30	40	40	110	0	0	180	upgrade to LED	\$185.42	\$137.97	\$47.45	(136)	
20	MV	100	CVPS	3	97	1972	Rt 15		15	44.509842	-72.974122	1	11200	Y	50	40	40	0	30	50	50	20	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
21	MV	100	CVPS	3	99	1972	Rt 15		15	44.509767	-72.975612	1	11200	Y	50	40	40	0	30	50	50	20	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
22	MV	100	CVPS	3	101	1972	Rt 15		15	44.509749	-72.976568	1	11200	Y	50	40	40	0	30	50	50	20	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
23	MV	100	CVPS	3	103-1	1972	Rt 15		15	44.509561	-72.977789	1	11200	Y	50	40	40	0	30	50	50	20	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
24	MV	100	CVPS	3	105	2003	Rt 15		15	44.509602	-72.979242	1	11200	Y	50	40	40	0	30	50	50	20	0	0	100	REMOVE	\$185.42	\$0.00	\$185.42	(438)	
25	MV	100	CVPS	3	105X	1972	Rt 15		15	44.509700	-72.979627	1	11200	Y	50	40	40	0	30	50	50	20	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
26	MV	100	CVPS	3	107	1972	Rt 15		15	44.509942	-72.980624	1	11200	Y	50	40	40	0	30	50	50	20	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
27	MV	100	CVPS	3	109	1972	Rt 15		15	44.509234	-72.981841	1	11200	Y	50	40	40	0	30	50	50	20	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
28	MV	100	CVPS	3	111	1972	Rt 15		15	44.509075	-72.983034	1	11200	Y	50	40	40	0	30	50	50	20	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
29	MV	100	CVPS	3	113	1972	Rt 15		15	44.508905	-72.984192	1	11200	Y	50	40	40	0	30	50	50	20	0	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
30	MV	100	CVPS	3	116	1965	Rt 15		15	44.508657	-72.985792	1	11200	Y	50	35	35	0	30	50	50	20	0	0	220	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
31	MV	100	CVPS	3	118	2005	Rt 15		15	44.508331	-72.986724	1	11200	Y	50	35	35	0	30	50	50	30	0	0	110	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
32	MV	100	CVPS	3	120	1972	Rt 15		15	44.507813	-72.987757	1	11200	Y	50	35	35	0	30	50	50	30	0	0	110	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
33	MV	100	CVPS	3	135	1972	Rt 15		15	44.507411	-72.988715	1	11200	Y	50	35	35	0	30	50	50	30	0	0	110	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
34	MV	100	CVPS	3	137	1965	Rt 15		15	44.507139	-72.989641	1	11200	Y	50	35	35	0	30	50	50	30	0	0	110	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
35	MV	100	CVPS	3	152-2	1972	Mill St		18	44.506156	-72.990305	3	0	Y	0	0	0	0	10	0	0	0	0	0	50	REMOVE	\$185.42	\$0.00	\$185.42	(438)	
36	MV	100	CVPS	3	167	1972	Rt 15		15	44.503185	-72.990335	1	11200	Y	50	40	40	0	30	50	50	20	0	0	160	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
37	MV	100	CVPS	3	171	1965	Rt 15		15	44.502963	-72.990735	1	11200	Y	50	50	50	0	30	50	50	80	0	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
38	MV	100	CVPS	35	3	1972	Packard Rd		15	44.508277	-72.977686	3	1600	Y	35	35	35	0	10	20	30	30	0	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(136)	see additions
39	HPS	70	CVPS	35	9	1993	Packard Rd		15	44.504681	-72.977762	3	1600	Y	35	35	35	0	10	20	30	30	0	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(136)	see additions
40	MV	100	CVPS	36	4	1965	Old Pump Rd		17	44.507632	-72.991119	3	90	N	35	35	35	0	10	10	0	0	0	20	REMOVE	\$185.42	\$0.00	\$185.42	(438)	see additions	
41	MV	100	CVPS	36	10	1965	Old Pump Rd		17	44.509955	-72.991224	3	90	N	35	35	35	0	10	10	0	0	0	20	REMOVE	\$185.42	\$0.00	\$185.42	(438)	see additions	
42	MV	100	CVPS	39	X1	1972	Lee River Rd		2	44.503769	-72.997697	2	1600	Y	35	35	35	0	20	20	20	40	0	0	30	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
43	MV	100	CVPS	39	2	1965	Plains Rd		6	44.503178	-72.997562	2	440	Y	35	25	25	0	20	20	20	20	0	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	
44	MV	100	CVPS	39	6-1A	1972	Plains Rd		42	44.503121	-72.997119	3	440	Y	35	35	35	0	20	20	20	40	0	0	80	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)	longer arm
45	MH	50	CVPS	39	132	2007	Wildier Rd		31	44.469561	-72.978895	3	0	N	0	0	0	0	10	0	10	0	0	20	REMOVE	\$185.42	\$0.00	\$185.42	(219)		
46	MV	100	CVPS	39	135	2000	Browns Trace		1	44.468710	-72.972573	2	4600	Y	40	25	25	0	20	30	180	50	0	280	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)		
47	MV	100	CVPS	39	137	1972	Browns Trace		1	44.468093	-72.971038	2	4600	Y	40	35	35	0	20	30	10	20	0	80	upgrade to LED	\$185.42	\$137.97	\$47.45	(267)		
48	MV</																														

# Appendix A

## Existing Jericho streetlights

1/26/2012

FIXTURE INFORMATION							LOCATION INFORMATION				ROAD DATA			SCORING				RECOMMENDATIONS														
Index	type	watts	utility	Line	Pole	year	Road Name	TH	latitude	longitude	Vtrans	class	ADT	paved	normal	posted	speed limit	road type	traffic count	road hazards	Public area	Location	TOTAL SCORE	action	current cost	new cost	savings	annual kWh	comments			
53	MV	100	CVPS	391	6	1965	Lee River Rd	2	44.501577	-72.994949	2	1600	Y	40	30	30	40	20	20	20	0	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)				
54	MV	100	CVPS	391	8	1965	Lee River Rd	2	44.500731	-72.993856	2	1600	Y	40	30	30	40	20	20	20	0	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)				
55	MV	100	CVPS	391	13	2004	Lee River Rd	2	44.498086	-72.990245	2	1600	Y	40	40	40	40	20	20	20	0	0	80	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)				
56	MV	100	CVPS	391	15-1	1965	Lee River Rd	2	44.497097	-72.989034	2	1600	Y	40	40	40	40	20	20	20	0	0	80	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)				
57	MV	100	CVPS	393	1	1965	Browns Trace	1	44.469564	-72.973158	2	4600	Y	40	25	25	40	20	30	30	0	0	80	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)				
58	MV	100	CVPS	393	2	1965	Jericho Ctr Circle	24	44.469997	-72.972796	3	0	Y	0	0	0	0	10	0	30	50	0	90	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)				
59	MV	100	CVPS	393	2-1	1971	Jericho Ctr Circle	25	44.469556	-72.972041	3	0	Y	0	0	0	0	10	0	80	50	0	140	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)				
60	MV	100	CVPS	393	4	1965	Browns Trace	1	44.470738	-72.972338	2	4600	Y	40	25	25	40	20	30	30	20	0	100	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)				
61	MH	70	CVPS	393	6	2007	Browns Trace	1	44.471096	-72.972083	2	4600	Y	40	25	25	40	20	30	30	50	20	120	upgrade to LED	\$185.42	\$137.97	\$47.45	(186)				
62	MV	100	CVPS	393	8	1972	Browns Trace	1	44.472092	-72.971216	2	4600	Y	40	35	35	40	20	30	30	10	20	80	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)				
63	MV	100	CVPS	393	10	1972	Browns Trace	1	44.472818	-72.970588	2	4600	Y	40	35	35	40	20	30	30	10	20	80	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)				
64	MV	100	CVPS	393	12	1972	Browns Trace	1	44.473490	-72.970041	2	4600	Y	40	35	35	40	20	30	30	10	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)				
65	MV	100	CVPS	393	13A	1965	Browns Trace	1	44.474229	-72.969458	2	4600	Y	40	35	35	40	20	30	70	0	0	120	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)	longer arm			
66	MV	100	CVPS	3913	3	1974	Sunnyview	57	44.504071	-72.994405	3	0	Y	25	25	25	25	10	0	50	0	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)	longer arm			
67	MV	100	CVPS	3913	5	1974	Sunnyview	57	44.503880	-72.992804	3	0	Y	25	25	25	25	10	0	50	0	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)	longer arm			
68	MV	100	CVPS	3913	7	1974	Sunnyview	57	44.504398	-72.991409	3	0	Y	25	25	25	25	10	0	0	0	0	10	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)	longer arm			
69	MH	50	CVPS	3913	9A	2010	Sunnyview	57	44.503472	-72.990175	3	0	Y	25	25	25	25	10	0	0	0	0	10	REMOVE	\$185.42	\$0.00	\$185.42	(219)	longer arm			
70	MV	100	CVPS	3913	11	1974	Sunnyview	57	44.502697	-72.988513	3	0	Y	25	25	25	25	10	0	50	0	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)	longer arm			
71	MV	100	CVPS	3913	13	1974	Sunnyview	57	44.501934	-72.987238	3	0	Y	25	25	25	25	10	0	0	0	0	10	REMOVE	\$185.42	\$0.00	\$185.42	(438)	longer arm			
72	MV	100	CVPS	3913	15	2001	Sunnyview	57	44.500973	-72.985562	3	0	Y	25	25	25	25	10	0	0	0	0	10	REMOVE	\$185.42	\$0.00	\$185.42	(438)	longer arm			
73	MV	100	CVPS	3913	17	1974	Sunnyview	57	44.500885	-72.984206	3	0	Y	25	25	25	25	10	0	50	0	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)	longer arm			
74	MV	100	CVPS	3913	21	1974	Sunnyview	57	44.502771	-72.986578	3	0	Y	25	25	25	25	10	0	0	0	0	10	REMOVE	\$185.42	\$0.00	\$185.42	(438)	longer arm			
75	MV	100	CVPS	3913	23	1974	Sunnyview	57	44.503242	-72.987886	3	0	Y	25	25	25	25	10	0	50	0	0	60	upgrade to LED	\$185.42	\$137.97	\$47.45	(287)	longer arm			
76	MV	100	VEC			?	Milo White Rd	54	44.405222	-72.974708	3	0	N	35	35	35	35	10	0	10	0	0	20	REMOVE	\$207.00	\$0.00	\$207.00	(438)	longer arm			
77	MV	100	VEC			?	Appletree Ln	54	44.441627	-72.974434	3	0	N	0	0	0	0	10	0	0	0	0	10	REMOVE	\$207.00	\$0.00	\$207.00	(438)	longer arm			
78	MV	100	VEC			?	Ayers Dr	54	44.442559	-72.975833	3	0	N	0	0	0	0	10	0	50	0	0	10	REMOVE	\$207.00	\$0.00	\$207.00	(438)	longer arm			
79	MV	100	VEC			?	Milo White Rd	54	44.441524	-72.976706	3	0	N	35	35	35	35	10	0	0	0	0	10	REMOVE	\$207.00	\$0.00	\$207.00	(438)	longer arm			
80	MV	100	VEC			?	Browns Trace	1	44.480005	-72.967253	2	4600	Y	40	40	40	40	20	30	50	0	0	100	upgrade to LED	\$207.00	\$143.16	\$63.84	(287)	longer arm			
81	MV	100	VEC			?	Lee River Rd	2	44.485854	-72.976871	2	1600	Y	40	40	40	40	20	20	40	0	0	80	upgrade to LED	\$207.00	\$143.16	\$63.84	(287)	longer arm			
TOTALS																												\$15,201.06	\$8,978.43	\$6,222.63	(23,411)	

TOTALS \$15,201.06 \$8,978.43 \$(6,222.63) (23,411)

CURRENT COST \$15,201.06  
Less removals \$(2,867.62)  
Add new lights \$551.88  
Efficiency savings \$(3,355.01)  
PROJECTED COST \$9,530.31  
TOTAL SAVED \$5,670.75

Lights removed 16  
Kwh removed -6132  
New lighting 683  
Efficiency savings -17279  
Total kwh savings -22728

# Appendix B

## Recommended additions

1/26/2012

LOCATION INFORMATION						ROAD DATA		SCORING				TOTAL						
Index	Road Name	TH	latitude	longitude	description	Vtrans class	AADT	paved	speed limit	road type	traffic count	road hazards	Public area	Location	SCORE	new cost	other	
86	Old Pump Road	17	45.524779	-72.945414	south end of one-lane bridge	3	90	N	35	35	10	10	50	0	0	70	\$137.97	motion detector control
87	Old Pump Road	17	44.508780	-72.993576	north end of one-lane bridge	3	90	N	35	35	10	10	50	0	0	70	\$137.97	motion detector control
88	Cilley Hill Road	9	45.524779	-72.945414	south end of one-lane bridge	3	90	Y	35	35	10	10	50	0	0	70	\$137.97	motion detector control
89	Lee River Road	2	44.498552	-72.990862	Clover Ln/Twin Meadows	2	1600	Y	40	40	20	30	40	0	0	90	\$137.97	

TOTAL \$551.88

## Appendix C

### SCORING SYSTEM

	<u>FACTOR</u>	<u>POINTS</u>	<u>COMMENTS</u>
Road Type			
	Vtrans class 1	+30	<i>State highways &amp; major collectors (Rt 15, Brown's Trace)</i>
	Vtrans class 2	+20	<i>Town highways, generally paved (Lee River Rd, Barber Farm Rd)</i>
	Vtrans class 3	+10	<i>All other roads, usually unpaved</i>
Traffic count			
	over 10000	+50	
	5001 to 10000	+40	
	1601 to 5000	+30	
	101 to 1600	+20	
	up to 100	+10	
	no data	0	
Road hazards			
	Intersections	0 to +100	<i>*see detail, below</i>
	Sharp turn	+50	
	Speed restriction	0 to +15	<i>(normal speed - posted speed) x2</i>
	Crosswalk	+20	
	Other	up to 50	<i>marked hazards or unique situations</i>
Public areas			
	Park or public space	+100	
	Commercial area	+50	
	Sidwalk	+20	
Streetlight location			
	Redundant	-50	<i>less than 100ft from another light</i>
	Off road	-100	<i>utility pole location cannot be changed</i>

\*Intersection score = road class points + traffic count points + speed points

## Appendix D

### Description of recommended removals

index	Road	Figure	Comments
23	Route 15	1	Located on the south side of the road on a pole serving a private residence. All other lights on Route 15 are on the north side. It was probably put on the south side to avoid a complicated installation on the heavily-loaded pole on the north side. On this stretch of Rt 15 lights are normally located on every other pole, but the next two poles to the west each have a light. This light is not necessary.
35	Mill Street	2	Because of extremely low vehicular and pedestrian traffic on this short dead-end street, this light provides essentially no public benefit. It's functionally a security light. We recommend offering the lease to the neighboring property owners or removing the light.
40	Old Pump Road	3	Located on a straight level section with residences only on the opposite side of the road. The location makes no sense given that the one-lane bridge (approximately 400 feet to the north) is a significant hazard but completely unlit. We recommend removing this light. See "New Lights."
41	Old Pump Road	3	See preceding note. We recommend removing this light and relocating it to the north end of the bridge. See "New Lights."
42	Lee River Road	4	Although this light is located at a significant intersection, it is within just a few yards of two other lights (part of the 2010 streetscape project). The area is already well lit and this fixture doesn't contribute much. We recommend removing it.
36	Route 15	5	Although it's on a speed-restricted section of Route 15, this light is attached to a pole more than 15 feet from the roadway. It can't be reoriented enough to be practical, therefore we recommend removing it.
67, 69	Sunnyview Dr	6	Sunnyview is the only neighborhood in Jericho with taxpayer-funded street lighting throughout. Some lights can be justified because of the many sharp turns in the road, but others are on straight sections with no traffic hazards, pedestrian facilities or speed reductions.
71, 72, 74	Sunnyview Dr	7	The Sunnyview loop has six lights, but only three locations where a light is really needed for safety reasons.
45	Wilder Rd	8	Located at the intersection of two roads with extremely low traffic. This light provides no discernible public benefit and is functionally a security light. We recommend offering the lease to the neighboring property owners or removing the light.
76, 77, 78, 79	Ayers Drive	9, 10	Lights in this neighborhood are very problematic. One is located on a private road, one is completely buried in vegetation, one is too far from the road and one is located on a road with no traffic hazards.

## Recommended New Lights

Utility	Road	Location	Figure	Notes
CVPS	Old Pump Road	Both ends of bridge	11	The Old Pump Road bridge is pretty hazardous: the northbound approach is obscured by a rise and sharp bend about 50 feet from the bridge. Northbound vehicles cannot see southbound traffic until they are nearly on the bridge. In addition, the road is popular with runners, walkers and bikers, adding to the hazard. Lighting on or adjacent to the bridge would make it much safer. Utility poles are located near both ends of the bridge. We recommend installing lights on both poles. We further recommend that these lights be wired into the same circuit, controlled by motion detectors at both ends of the bridge. This control scheme would offer motorists an important visual cue about traffic approaching from the opposite direction, or the presence of pedestrians on the bridge.
CVPS	Cilley Hill Road	North end of bridge	12	Like Old Pump Road, this is a one-lane bridge which isn't aligned with the road. Visibility is much better here because the road is more level. But like Old Pump Road, it's a popular pedestrian route and a light adjacent to the bridge would make it much safer. We recommend the north end because the utility pole is closer to the bridge. As on Old Pump Road, we recommend controlling this light with motion sensors aimed both directions along the road.
CVPS	Lee River Road	Clover Lane intersection	13	This four-way intersection is located at the top of a rise (eastbound) just west of Lafayette Drive. Installation is simple since a utility pole exists on the southeast corner of the intersection.
CVPS	Route 15	Griswold Street intersection	14	This isn't actually a new light; we recommend moving the existing light (at CVPS pole 120) to the other side of Route 15, at the intersection of Griswold Street. This location would maintain the continuous lighting on the speed-restricted section of Route 15 but also illuminate the intersection and the end of the new sidewalk.

Aerial images on the following pages are courtesy of the Vermont Center for Geographic Information.



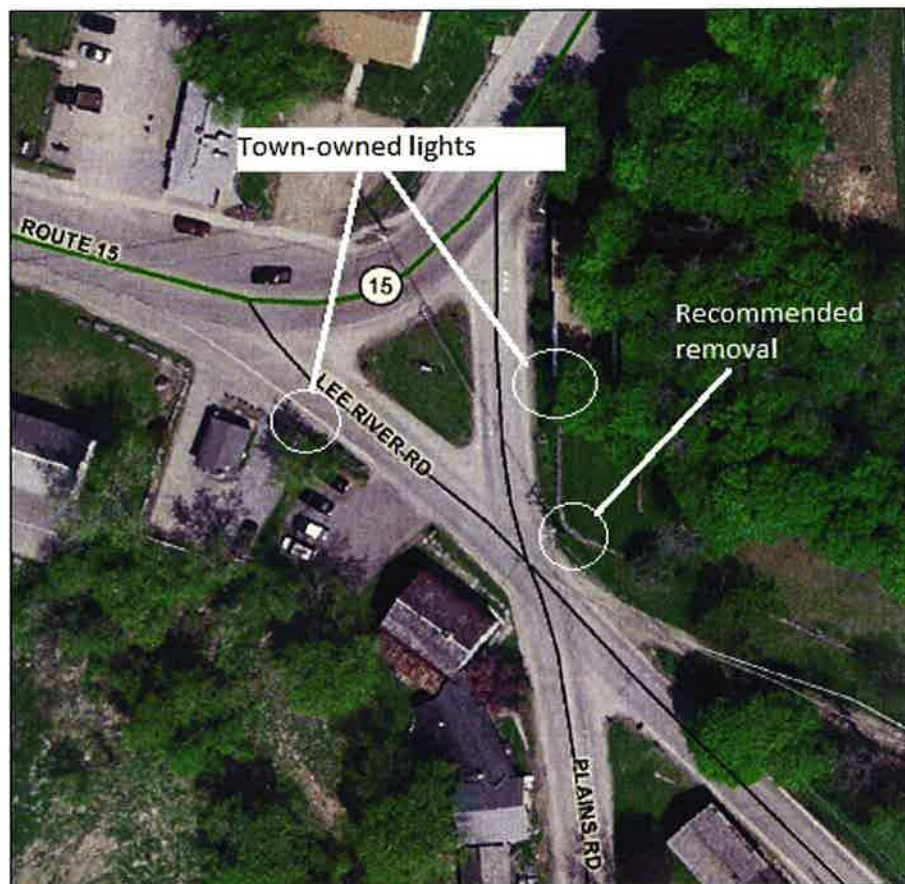
**Figure 1.** Redundant streetlight on Route 15 between Cilley Hill Road and Packard Road. All the lights in the 40mph zone are on the north side, except this one. It was probably installed on the south side because there's no room on the pole on the north side. Since it was installed, another light was added on the next pole west, making this light unnecessary. We recommend it be removed.



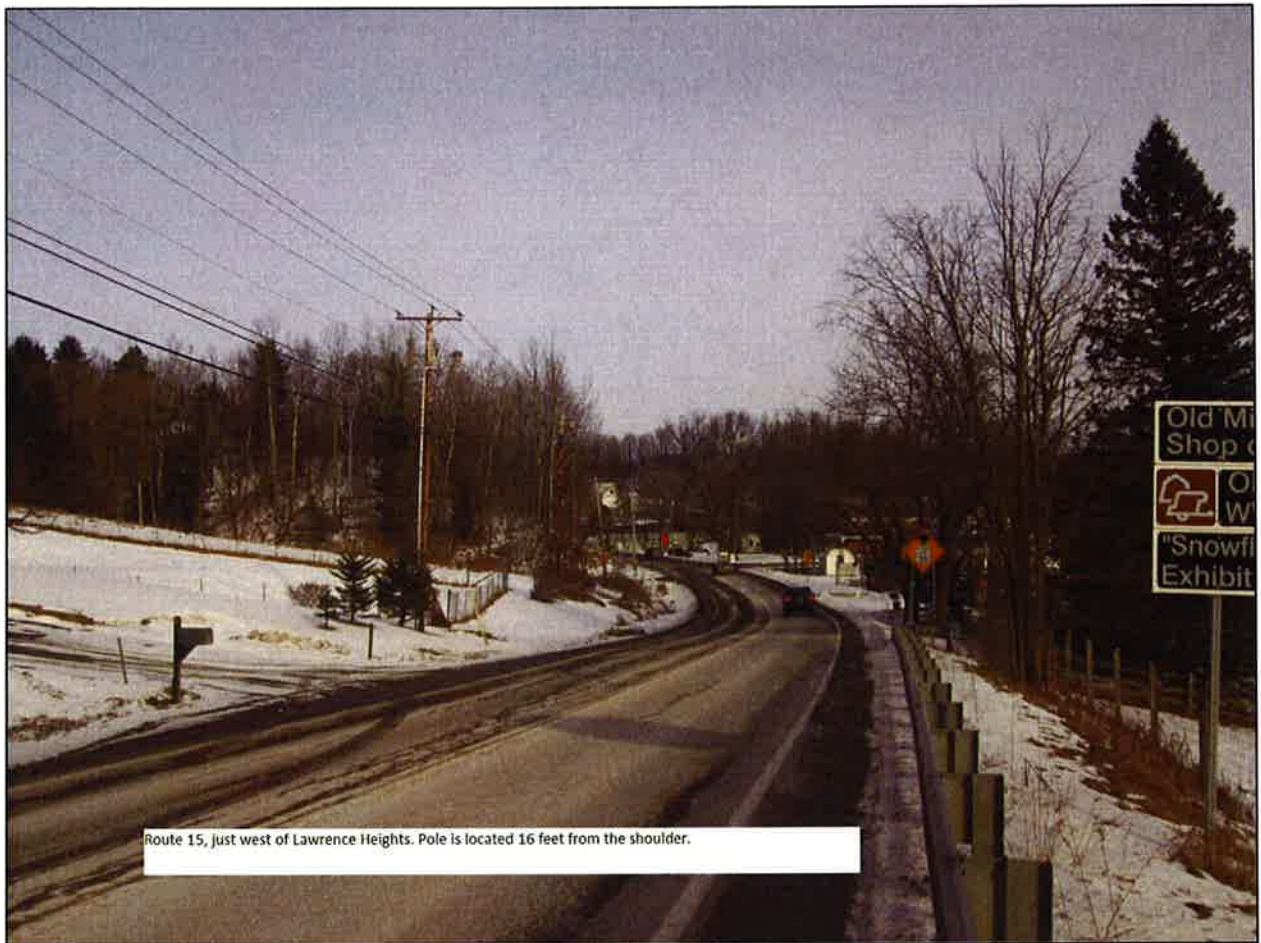
**Figure 2.** Mill Street. With extremely low traffic and no sidewalks, it's hard to justify this light.



**Figure 3.** Existing lights on Old Pump Road. The light toward the south end of this view is about midway between Route 15 and the one-lane bridge. The light at the north end of this view is two utility poles north of the bridge. There are no significant traffic hazards at either location – yet there’s no light at the bridge, which has very limited sight distances both directions. See “New installations” for more discussion.



**Figure 4.** Intersection of Lee River Road and Route 15. The light recommended for removal is at a major intersection but is within just a few feet of newly-installed lights. It's probably unnecessary.



Route 15, just west of Lawrence Heights. Pole is located 16 feet from the shoulder.

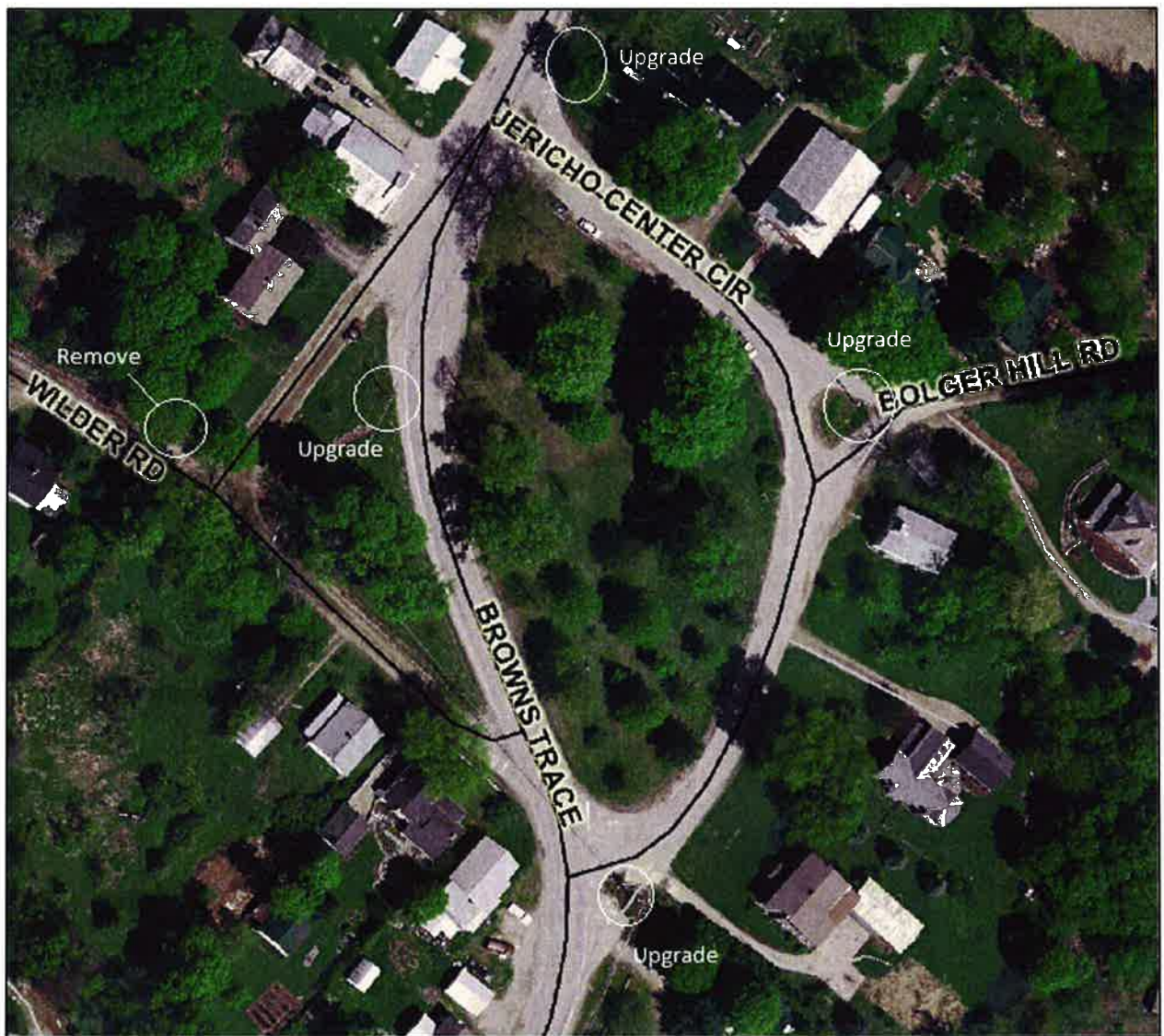
**Figure 5.** Route 15 between Lawrence Heights and Mountain View. This utility pole is so far from the road that it's not very useful as a streetlight support. The existing light mainly illuminates the lawn beneath.



**Figure 6.** Sunnyview Drive, west end. The two lights indicated here are on wide-open and relatively straight sections of the road. The other lights in this section are located at the sharp bends.



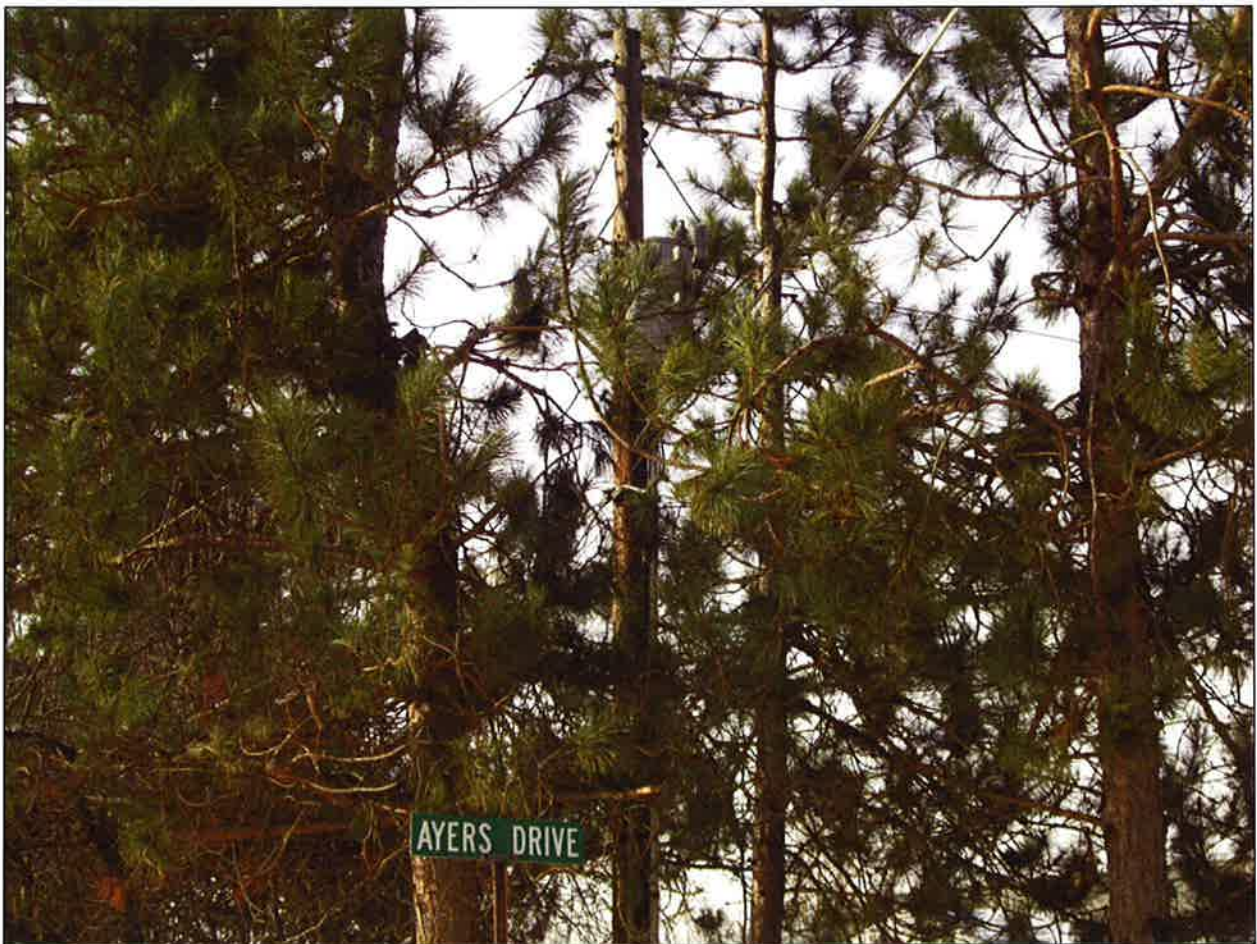
**Figure 7.** Sunnyview Drive loop. The three lights indicated here are on wide-open and relatively straight sections of the road. The other lights in this section are located at the sharp bends.



**Figure 8.** Lights around Jericho Center Circle. The light on Wilder Road is not close enough to illuminate the intersection, there's very little traffic and no sidewalk, and the light is obscured by seasonal vegetation. Other lights on the Circle are worth keeping, either due to traffic level, pedestrian safety, or for illuminating public parking adjacent to the Green.



**Figure 9.** Milo White Road and Ayers Drive. The light at the intersection of Ayers Drive and Milo White Road is about 15 feet back from the road and completely surrounded by evergreens. See the photo that follows. Appletree Lane is a private (not Town) road. The light at the curve on the east end of Ayers Drive is too far from the roadway to be practical. The light on Milo White Road at the bottom of this view is at least public, visible and practical, but the traffic level at this location may not warrant its continuation.



**Figure 10.** Ayers Drive at Milo White Road. The streetlight is to the left of the transformer, barely visible in this view. This light really doesn't illuminate the road at all.



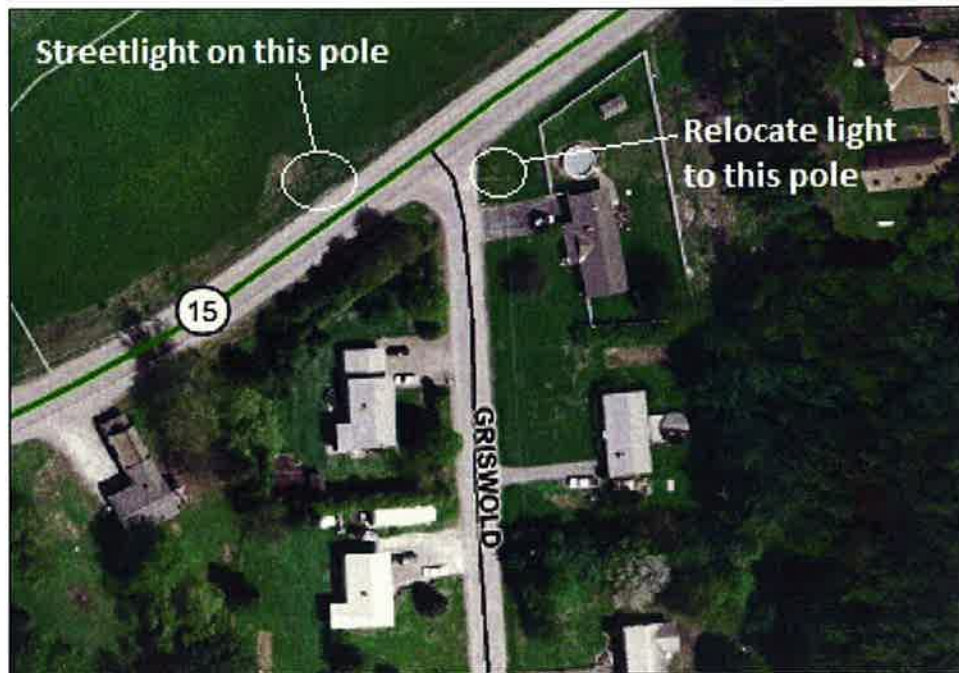
**Figure 11.** Old Pump Road bridge. Northbound vehicles can't see the bridge until they're into the curve at the bottom of this view, where they can suddenly meet oncoming traffic. Motion-controlled lights would alert drivers to the presence of other vehicles or pedestrians.



**Figure 12.** Cilley Hill Road bridge. A light is needed at one end or the other, but not both; unlike Old Pump Road the bridge approach is clear both directions. A light at the north end would provide better illumination for pedestrians. Motion controls would activate this light only on the approach of vehicles or pedestrians from either direction.



**Figure 13.** Lee River/Clover Lane/Twin Meadows intersection. About ¼ mile east of the speed zone, this intersection is at the top of a rise (eastbound) and immediately adjacent to existing lights at the entrances to Lafayette Drive.



**Figure 14.** Relocation of existing light to the intersection of Griswold Street and Route 15. The location maintains a streetlight within the speed-restricted section of Route 15 but also illuminates the intersection and adjacent pedestrian crossing on Griswold Street.